

(1) Deep SWP Spectra of "Marginal" BY Dra Stars
(2) UV Spectra of the "Super-Cycle" Star: HD 10780

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A deep SWP spectrum (395 min) of the “marginal” BY Dra (mBY) star GL 256 shows no obvious C IV or other transition region line emission. This is at odds with other members of the class (GL 425a, GL 900) and raises the question whether GL 256 is a bona fide member of this group (which are believed to be intermediate in age/activity between dM and dMe stars). Analysis of optical high resolution spectra indicate the star is somewhat warmer than previously suspected (spectral type K5-7 V versus K8 V) and the rotational velocity is relatively low ($v \sin i < 4$ km/s) and the star is the least active at H alpha of all the mBY stars. We suggest that the star is in fact NOT a “marginal” BY Dra star. It now seems likely that a low accuracy measurement of Ca II emission by Bidelman misled Bopp into inaccurately classifying the star as an mBY.

There appears to be relatively few mBY stars, suggesting that they occupy a relatively brief period in M dwarf evolution when chromospheric densities are just sufficient to “fill in” H alpha without driving it into full emission (i.e., a dMe star). As such, mBY stars may offer a useful age discriminator unavailable for most M dwarfs. These results are being combined with other optical, UV, and X-ray data in a comprehensive analysis of these interesting transitional stars.

Two sets of IUE observations of the “super dynamo cycle” star HD 10780 (so-called because of its extremely large Ca II magnetic cycle amplitude) were obtained in SEP 1992 and JAN 1993. Ca II measurements before SEP 1993 suggested that the star should be entering a steep declining phase in its dynamo cycle. Contrary to these expectations, the JAN 1993 data showed the star to be considerably MORE active than in SEP in both upper chromospheric and transition region lines. Simultaneous Mt. Wilson Ca II data also indicate a change in the expected behavior — the star appears to have confounded expectations and does not have a simple, quasi-sinusoidal dynamo cycle. Optical spectra show the star has a very low $v \sin i$ (< 2 km/s), consistent with its low average Ca II emission level. The star is thus likely quite old (> 4 Gyr). As the data do not occur at dynamo cycle extremes (as originally hoped), they cannot be used to explore the questions originally posed in the proposal. We plan to publish them instead in a forthcoming study of activity in older cyclic dynamo stars.